

AUTOTHERMAL REACTOR AND METHOD FOR
PRODUCTION OF SYNTHESIS GAS

Abstract

An autothermal reactor and method for producing synthesis gas in which a heated oxygen containing stream is expanded into a mixing chamber to entrain a hydrocarbon containing stream to form a reactant stream without reaction of the oxygen and hydrocarbon contents of the streams. The reactant stream is reacted in a series of sequential catalytic reaction zones to react the hydrocarbon and oxygen contained in the reactant stream to form the synthesis gas. The sequential catalytic reaction zones are configured such that an initial partial oxidation reaction occurs that is followed by endothermic reforming reactions having ever decreasing temperatures. The sequential catalytic reaction zones in which the endothermic reforming reactions occur contain a precious metal catalyst supported on ceramic supports that have successively greater surface areas to compensate for the temperature decrease while remaining stable and without a transform in state.